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Q1 Data processing

1. Tokenizer

本次作業我使用 BERT 及 RoBERTa 預訓練模型，並同時使用其 tokenizer 實現 tokenize。BERT 的 tokenizer 將輸入文本拆分、分詞，並添加特殊 tokens 做為輸入，如[CLS]為序列的開始、[SEP]為分隔、[PAD]用以填充等等。而 RoBERTa 和 BERT 類似，但透過更大的詞表提供性能。

2. Answer Span

i. 透過 offset mapping，能將 token 轉回原文本中字詞的位置，並計算起始及結束位置。

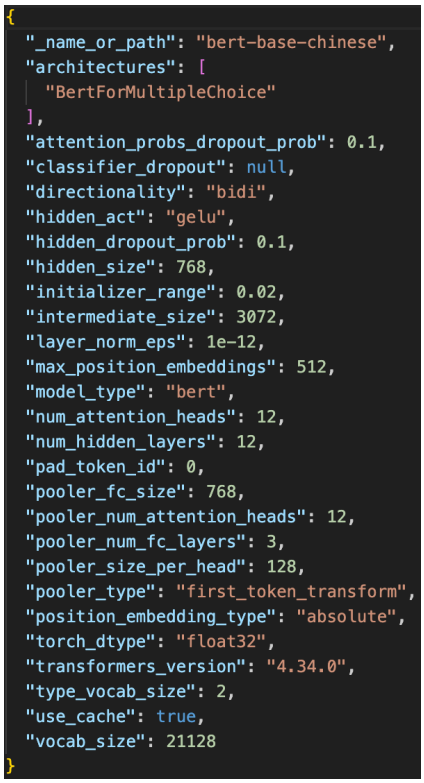
ii. 去除負長度及過長的答案，取出前 n_best_size，計算 softmax 並回傳機率最高者。

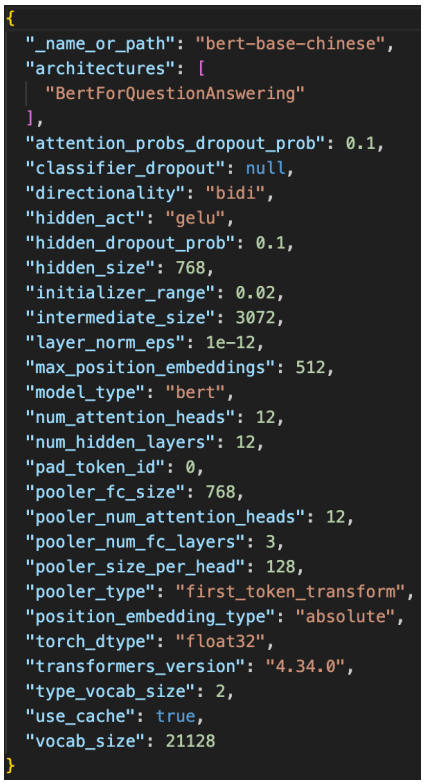
Q2 Modeling with BERTs and their variants

1. Model 1

i. Model

bert-base-chinese





ii. Performance

MC: 0.9498

QA: 76.936

iii. Loss function

CrossEntropyLoss

iv. Optimization algorithm, learning rate and batch size

AdamW()

Learning rate = 3e-5

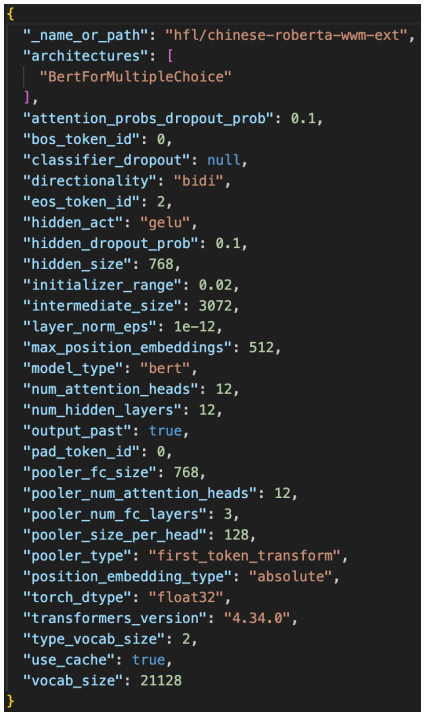
Effective batch size (MC) = 2 * 2

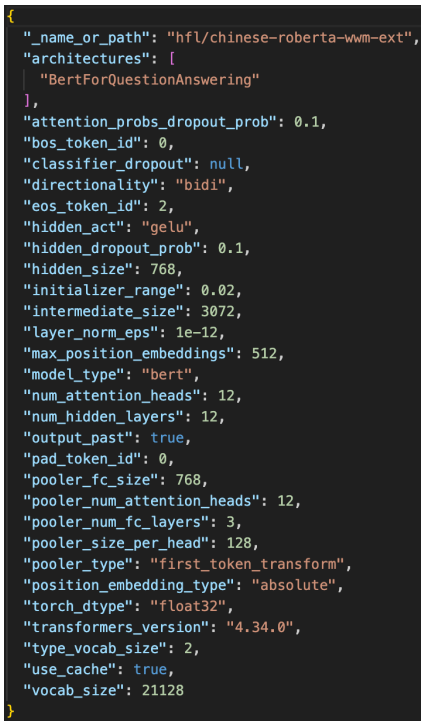
Effective batch size (QA) = 2 * 2

2. Model 2

i. Model

hfl/chinese-roberta-wwm-ext





ii. Performance

MC: 0.9598

QA: 81.555

iii. Loss function

CrossEntropyLoss

iv. Optimization algorithm, learning rate and batch size

AdamW()

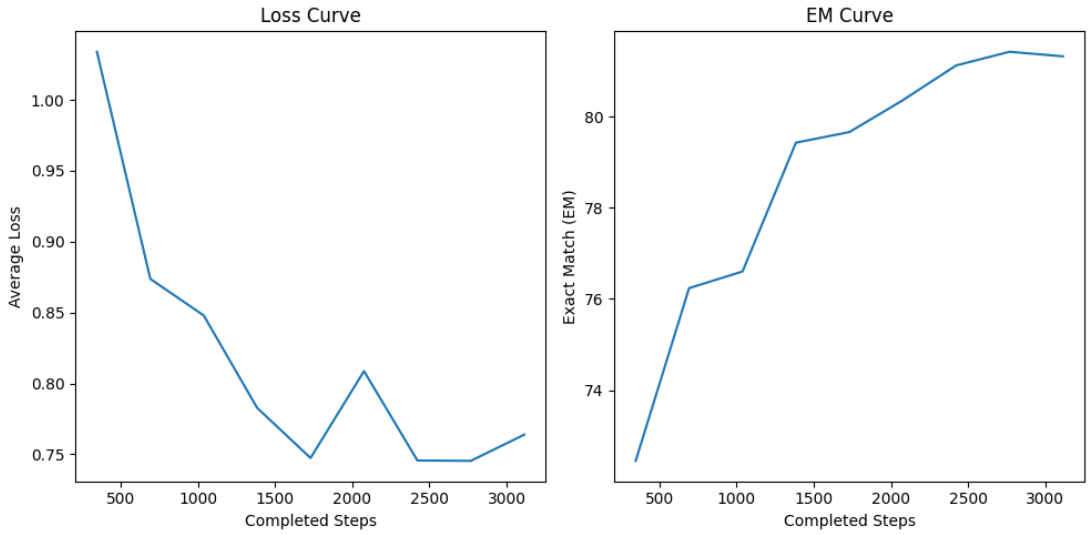
Learning rate = 5e-5 with warmup_steps = 300

Effective batch size (MC) = 2 * 2

Effective batch size (QA) = 16 * 1

RoBERTa 相較 BERT 使用了更大的 BPE 詞彙表及更多的文本資料、更大的 batch size 進行預訓練，並使用動態 masking 機制且移除下一句預測任務。

Q3 Curves (Validation set)



Q4 Pre-trained vs Not Pre-trained

1. Model

   模型和 Model 2 一樣，但去除所有 pretrained weights。

```
{
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}
```


2. Performance

   i. Exact match: 4.653

   ii. Kaggle score: 0.08589

可以看出預訓練及非預訓練模型在預測表現上的極大差別。

Q5 Bonus

1. Model

   severinsimmler/xlm-roberta-longformer-base-16384

2. Performance

   i. Exact match: 71.252

   ii. Kaggle score: 0.6962

3. Loss function

   CrossEntropyLoss

4. Optimization algorithm, learning rate and batch size

   i. AdamW()

   ii. Learning rate = 3e-5

   iii. Effective batch size = 4 * 2